

Appl. No. : 10/730,670
Amdt. dated March 28, 2005
Reply to Office Action Mailed December 29, 2004

Amendments to the Specification:

Please insert the following short paragraphs after the paragraph beginning at page 9, line 183, which starts with "Fig. 8 shows an embodiment" and before the section beginning at page 9, line 186, which is titled "Detailed Description of Preferred Embodiment":

Fig. 9 shows an expansion shell having more than two wedge fingers.

Fig. 10 shows a camming nut having flat sides to engage the wedge fingers.

Fig. 11 shows a support washer for maintaining the location of a camming nut.

Fig. 12 shows a bolt portion of a mine roof bolt system having different diameters with a tapered section in between.

Fig. 13 shows the location of a support washer on the taper section.

Fig. 14 shows the mine roof bolt apparatus assembled.

Fig. 15 shows an expansion shell having more than two wedge fingers comprising bail and wedge portions.

Fig. 16 shows a mine roof bolt having an inverted camming nut.

Fig. 17 shows an alternative embodiment of the mine roof bolt apparatus.

Please replace the paragraph beginning at page 10, line 209, which starts with "As has been discussed, an adhesive is frequently used in the anchoring process." with the following amended paragraph:

As has been discussed, an adhesive is frequently used in the anchoring process. The adhesive is contained in pouches which are placed in the hole before the bolt is inserted.

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Because the expansion shell (50) may be placed at the leading end of the threaded section (30) of the bolt portion (10), it may be necessary to shape the threaded nut portion (60) of the expansion shell (50) in such a way that the adhesive can flow past it when the mechanical anchor is inserted into the hole. As one example, if the expansion shell (50) has two ~~wedging~~ wedge fingers (70), the threaded nut portion (60) can have a flattened shape wherein the wedge fingers (70) attach at the narrower sides. The flattened shape would create greater clearance between the threaded nut portion (60) and the sides of the hole, allowing adhesive to flow past the threaded nut portion (60) as the mechanical anchoring system is inserted into the hole. As another example, if an expansion shell (50) has three wedge fingers (70) attached to it, the threaded nut portion (60) could have a clover leaf shape wherein the wedge fingers (70) attach at the lobes of the clover leaf and the adhesive could flow past the threaded nut portion (60) through the interstices, or notches, between the lobes. Configurations with additional wedge fingers (70) would require other, perhaps similar, shapes.

Please insert the following paragraphs after the paragraph beginning at page 12, line 241, which starts with "Fig. 8 shows an embodiment wherein the threaded nut portion of the expansion shell" and before the paragraph beginning at page 12, line 255, which starts with "In one embodiment, the quantity of machine threads":

Fig.'s 9 through 17 illustrate some of these additional embodiments. Fig. 9 shows an expansion shell 50 having greater than two wedge fingers 70, in this case, three wedge fingers 70. Notches 90 in the periphery of threaded nut portion 60 allow the adhesive to flow past threaded nut portion 60 when the mine roof bolt is inserted into a hole in a mine ceiling.

Fig. 10 shows a camming nut **40** with flat sides as opposed to a smooth conical shape. The number of flat sides must be at least that of the number of wedge fingers **70** on an accompanying expansion shell **50**. If it is desired to use a camming nut **40** with flat faces on its incline, it must be able to spin on the bolt portion **10** of the mine roof bolt and match its rate of turn on the bolt portion **10** with that of the accompanying expansion shell **50**. This free rotation is allowed by supporting the camming nut **40** with a support washer **100**. Support washer **100** is shown in Fig. 11.

Support washer **100** can be fixed in position along the length of the mine roof bolt with various techniques including welding and crimping support washer **100** to mine roof bolt **10**. Fig. 12 and Fig. 13 show another method by which support washer **100** can be held in place. The thread portion **30** in Fig. 12 and Fig. 13 is smaller in diameter than the rest of bolt portion **10**. A taper section **110** transitions from smaller to larger diameter sections and the inner diameter of support washer **100** matches some diameter in that transition, probably one closer to the smaller diameter of the machine threads **30** than the larger diameter. This keeps the support washer **100** in a fixed location. A camming nut **40** resting on support washer **100** will be able to turn freely while being held in its longitudinal position by support washer **100**.

Fig. 14 shows support washer **100**, camming nut **40** with flats, and expansion shell **50** with three wedge fingers **70** assembled onto bolt **10**. Support washer **100** maintains camming nut **40** at fixed location while allowing camming nut **40** to turn about bolt **10** as expansion shell **50** advances along machine threads **30**. Expansion shell **50** is advanced along machine threads

30 by turning bolt portion **10** of bolt assembly **80**.

Fig. 15 through Fig. 17 illustrate another embodiment which is a further development of the embodiment illustrated in Fig. 8. Fig. 15 shows expansion shell **50** having more than two wedge fingers **70** wherein the wedge fingers **70** are reshaped to work in tension as opposed to compression. Notches **90** in threaded nut portion **60** allow adhesive to flow past threaded nut portion **60** as bolt assembly **80**, seen in Fig. 17, is inserted into a mine roof hole. In this embodiment wedge fingers **70** have a bail section which is reduced down to bails **120** and a wedge section at the end which flairs to a wedge **130**. In this embodiment camming nut **40** is fixed along the length of bolt portion **10**, but its largest diameter is nearest machine threads **30** while its smallest diameter is directed toward the driven end having means of turning **20** attached. The orientation of camming nut **40** for this embodiment can be seen in Fig. 16 and the interrelation of expansion shell **50** and its wedges **130** with camming nut **40** may be seen in Fig. 17.

To install bolt assembly **80** of Fig. 17, it is inserted upward into a mine roof hole and driven at the means for turning **20** to advance threaded nut portion **60** along machine thread **30**. In this case, threaded nut portion **60** moves away from camming nut **40** and bails **120** pull wedges **130** into engagement with camming nut **40** which forces wedges **130** out. The resulting anchoring effect may be seen by referring back to Fig. 8.